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ABSTRACT

A study was conducted to determine whether a relationship exists between several selected socioeconomic characteristics and the adoption or non-adoption of soil testing as a farm management tool and to establish whether or not a statistically significant relationship exists between adopters and imperfect adopters (discontinuers). Data were collected from 166 Pennsylvania farmers whose names were supplied by the Pennsylvania State University Testing Service and county agents. Names from the testing service were known users of the soil testing program in 1970 and 1971. County agents were given the names of the known testers and asked to match them as nearly as possible by size and type of farm operation and, if possible, by neighborhood with names of nontesters or discontinuers. Each individual was interviewed by telephone. Results showed that nontesters had a lower level of formal education than those who had previously used soil testing. Nontesters were older than testers, had lower gross farm income, and lower organizational participation scores. Adopters were younger, had higher organizational participation, had nearly two additional years of formal schooling, were more likely to own their crop land, and were slightly more prone to adopt other farming innovations than were discontinuers. Nontesters who had considered testing had a higher level or organizational participation than other nontesters. Implication and limitations of the study are discussed. (Author/KM)

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Selected Socioeconomic Characteristics of Farmers Associated with the Use of Soil Testing

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BACKGROUND

This study is the result of questions that were raised by the Research and Higher Education Committee of the Pennsylvania Plant Food Educational Society concerning the fact that the adoption of soil testing as a farm management tool has not been used by all Pennsylvania farmers.

The purpose of the study is to analyze selected socioeconomic characteristics that may predispose an individual to adopt soil testing as a practice, and further to analyze the selected characteristics as they relate to the non-adoption phenomenon found among non-testers.

Prior to the 1950's The Pennsylvania State University offered a free soil testing service to Commonwealth farmers. This service became antiquated, had numerous shortcomings and was discontinued for several years. The Pennsylvania State University offered a revised service of soil testing on a user-fee basis beginning in 1951. This new program offered several types of tests, including one designed specifically for soils intended for production of agronomic crops. It is this specific soil test that serves as the focus of this study. In this revised fee program, the fee for a basic soil test was set at $1.00 and optional tests for magnesium and calcium levels were available at $.50 per test. The cost

of these tests, which includes the calcium and magnesium tests was increased to $2.00 in 1970.

The mechanics of the program are as follows: a representative soil sample is collected from a field and submitted to The Pennsylvania State University soil testing laboratory for analysis. The soil is chemically tested at the laboratory for lime requirements and phosphorus, potassium, magnesium, and calcium contents. Based upon results of the analysis, crop specialists make fertilizer recommendations that will lead to a balanced soil fertility condition for that field. The intent is to build soil nutrient reserves and hold them in balance, without depletion of the natural deposits or added soil nutrients, while maximizing yields from the crops grown on the soil.

A principal advocate of soil testing has been The Agricultural and Home Economics Extension Service of The Pennsylvania State University. This organization has played the role of educator in relating the benefits of soil testing to potential users and acting as a supplier of testing information and soil sample mailing kits. The general premise is that net farm income can be substantially increased by the adoption of this management practice. Adoption is sought through the use of soil testing demonstrations.

Advocates of this practice maintain that soil testing is the only reliable way a farmer can determine the

fertility level of his fields, and maintain them in a balanced condition without gross overfertilization. Excessive amounts of fertilizer are costly and possess the potential of being an environmental hazard. Run-off of nutrients from over fertilizing can contaminate water supplies. Conversely, underfertilization does not permit maximization of potential yield. In this era of close economic margins this latter point becomes more important because of increased pressure to produce maximum yields with a minimum input.

Despite 20 years of educational effort on the part of Extension personnel and representatives of lime and fertilizer companies, there are Pennsylvania farmers who have never used soil testing or who have tested soil and subsequently stopped using this management practice.

THE PROBLEM

Three questions emerge:

(1) Why do some individuals adopt this recommended management practice (soil testing) while others do not? Are there statistically significant differences between the two groupings?

(2) Are there statistically unique factors between those who permanently adopt and those who discontinue this management practice after a trial period?

(3) What educational or procedural thrust can Extension advocates of this management practice implement that will further expand its use?

These questions are the focal point of this study. An attempt will be made first to identify the differentiating characteristics between adopters and non-adopters, secondly to account for differences between "permanent" adopters and discontinuers, and finally to indicate ways that adoption of soil testing may be increased.

THEORETICAL CONSIDERATIONS

Adoption Models: The traditional definition of adoption in the social sciences has meant "full use" (Rogers, 1962) or 100 percent utilization of a practice, or "the full-scale integration of the farm practice into the on-going farm operation." (Lionberger, p. 4, 1960)

Both of these definitions refer to the adoption process model. The model is a series of mental decision making steps an individual goes through between initial exposure to an innovation and his final adoption of the practice. The five steps in this classical model are: (1) awareness, (2) interest, (3) evaluation, (4) trial, and (5) adoption. (Rogers, 1962 and Lionberger, 1960)

Recent literature suggests that this five-step model is inadequate to explain this mental phenomenon known as the adoption process. The main area of concern seems to center around the practice of discontinuence or intermittent use, which was seen by some as an impermanent adoption. (Rogers, 1962)

Frequently, after what appears to be full-use adoption, an individual will discontinue the use of a practice and the entire innovation will be reconsidered. (Lionberger, 1960) A more elaborate model has evolved from this line of reasoning that permits conceptualization of the process more in concert with actual behavior. This model has a series of re-evaluations built into it to account for the cases where an individual who doesn't adopt a practice the first time he considers it, reconsiders and adopts the practice at a future date. Figure I visually illustrates the point.

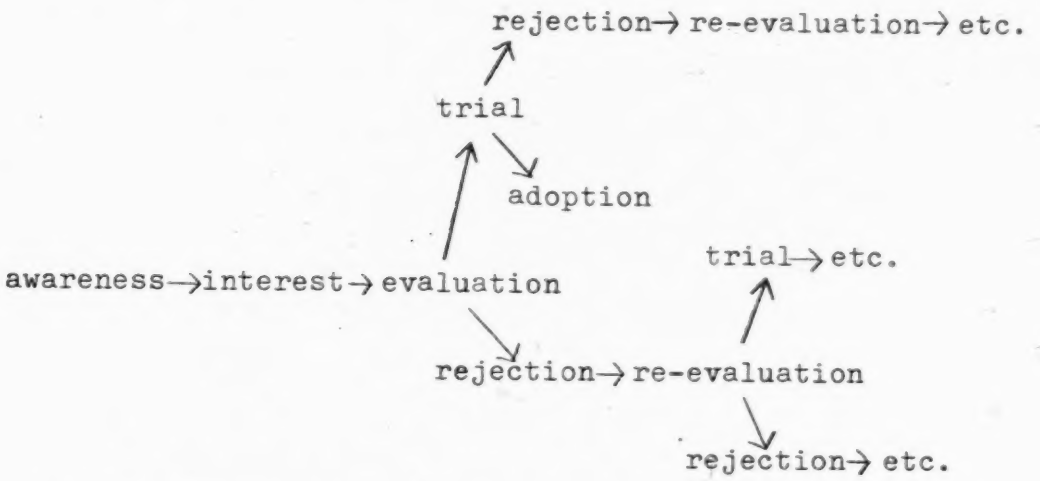

Figure I. The Adoption Tree (Campbell, p. 462, 1966)

This discussion would be incomplete without consideration of the concept, symbolic adoption. Contrary to the popular attitude that symbolic adoption is limited to a nonmaterial idea or position is the hypothesis that

symbolic adoption may be an integral part of all adoption decisions. (Rogers, 1962 and Lionberger, 1960) In this hypothesis the first three steps in the adoption process are seen as the symbolic adoption portion. Figure II serves to illustrate this concept.

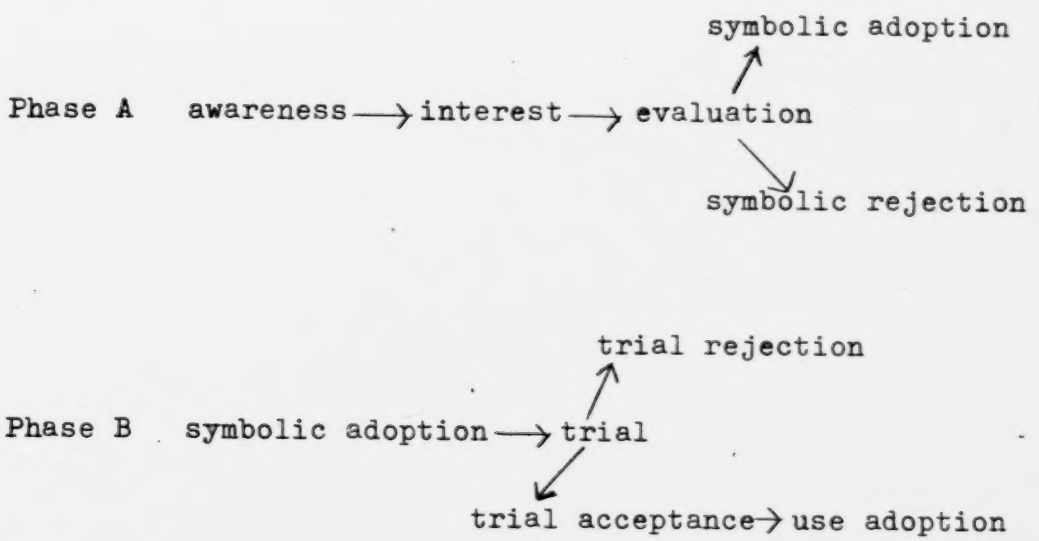

Figure II. Two-phase Adoption Model
(Klonglan and Coward, p. 80, 1970)

Symbolic adoption is the mental portion of the procedure. When an individual decides to try an idea, symbolic adoption has been achieved. However, symbolic adoption does not necessarily coincide with the physical adoption of the innovation. Klonglan and Coward (1970) have pointed out that a definite "lag" exists between the two phases of the adoption procedure. This two-phase adoption model permits us to separate rejection into two classes, symbolic rejection and trial rejection.

These two models make it possible for us to conceptualize how different individuals arrive at the point of actual vs. symbolic adoption at different times. From this knowledge, researchers have been able to categorize persons by their rate of delay between introduction to an idea and adoption or rejection of the idea.

Rate of Adoption

All individual adopters do not reach the adoption stage at the same time. (Rogers, 1958) Furthermore, the length of time it takes an individual to pass from the awareness stage to the adoption stage varies widely. The rate at which an individual progresses through the mental steps of the adoption process has lead to the categorization of five categories of adopters in the literature: innovators, early adopters, early majority, late majority, and laggards. (Rogers, 1962) Figure III graphically illustrates this concept.

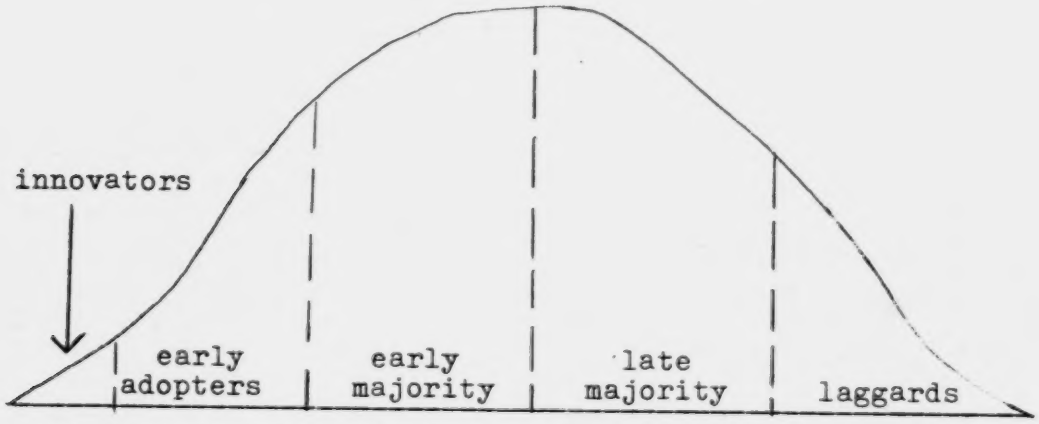

Figure III. Adoption Curve (Lionberger, p. 37, 1962)

These different categories tend to take the preceding configuration when plotted on a normal curve. The majority, both early and late, are represented by the area plus and minus one standard deviation[1] from the mean. Innovators, early adopters, and laggards fall at the extremes of the majority.

Earlier studies of farm practice adoption have shown the following characteristics to distinguish the earlier adopters from the later adopters; and the more extreme the comparison of rate of adoption the more pronounced the difference. The earlier adopters tend to have:

(1) A lower average age

(2) A larger gross farm income

(3) A higher social participation

(4) More formal schooling

(5) A lesser degree of attachment to land ownership

(6) Adopted other innovations

More specifically, studies of the adoption of approved farm practices reveal the following about an

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[1]Standard deviation is a measure of dispersion expressed as the square root of the variance within a given sample. It can be used to predict the distribution of a population based on data from a representative random sample. One standard deviation plus or minus the mean represents 67 percent of a given population. (Alder, 1962) Necessarily the innovators, early adopters categories represent about 16 percent of a given population, while the laggard category represents the remaining 16 percent.

individual's characteristics in relation to his rate of adoption of such practices.

Age: Earlier adopters are younger in age than later adopters. Schneider (1971) found this to be true among farmers in our Pennsylvania study area. The greatest difference in averages of age is found in comparisons between innovators and laggards. (Lionberger, 1960) Rogers (1962) has stated that this difference in the rate of adoption, however, is probably resultant more from the culture in which the different ages of people were socialized than from the characteristic age, itself.

Gross Income: Higher gross farm incomes are associated with earlier adopters. One study conducted in New York State found gross farm income to be one of the most accurate predictors of adoption behavior. (Finley, 1966) Stuby (1965) has shown that the relationship between adopter and non-adopter incomes tends to be statistically significant. Lionberger (1960) has argued that a relationship between quickness to adopt improved farm practices and higher farm incomes does exist.

Social Participation: Individuals who belong to, and are active in, numerous organizations tend to adopt innovations earlier than those that are less active socially. Schneider's (1971) study found this to be the case.

A possible and acceptable avenue of explanation for this participation - adoption relationship is to examine the type of relationships persons have with other people. In this regard, researchers have found the earlier adopters more likely to be aligned with a Gesellschaft[2] systems orientation, while the later adopters tend to participate disproportionately in the more Gemeinschaft[3] systems. (Bohlen, 1964)

Education: Rate of adoption is directly related to number of years of formal schooling. This has been substantiated in several studies (see for example, Schneider, 1971). However, it is not one of the most reliable indicators of rate of adoption because of the effect age, income characteristics, work experience, and continuing education have upon it. (Lionberger, 1960) Thus, due to this interactive effect it is unfair to directly compare the educational levels of two people who are separated by 40 years of age, because as time has progressed the expected or mandated level of formal educational attainment required of persons has increased. Income tends to have much the same effect. Several

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[2]Gesellschaft is characterized by relatively weak primary relationships, its emphasis is on utilitarian goals, and the impersonal and competitive nature of its social relationships. (Theodorson, 1969)

[3]Gemeinschaft refers to a society characterized by intimate primary relationship, with an emphasis upon tradition, consensus, and informality. (Theodorson, 1969)

studies in the mid-west found formal educational attainment was of only minor statistical significance when economic and personality variables were considered in a multiple correlation analysis, that is in an interactive manner. (Copp, 1958)

Ownership: The ownership of land is less meaningful to early adopters than to later adopters. "Innovators and early adopters are more ends oriented while those slowest to adopt tend to be more means oriented." (Bohlen, p. 278, 1964) Maximization of profits tends to be the end to achieve for an earlier adopter, therefore land, labor, and other related things become the means to the end he hopes to achieve. To the late adopter, land ownership becomes an end. (Bohlen, 1964)

Adoption of other Farm Innovations: Logically, the rate of adoption of any innovation would be influenced by the number of previous adoptions of other farm practices defined as satisfactory by the adopters.

The research along these lines tends to show a pattern of adoption in which those adopting innovations do so consistently and those that do not adopt do so consistently. (Rogers, 1962)

Other studies have shown that the late adopter tends to fall below the median[4] of adoption of farm practices

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[4]The median of a series of numbers arranged from largest to smallest is the middle number if an odd number

that would be expected to improve their situation. (Fliegel, 1960)

Communication Sources: Cooperative Extension, along with other agriculturally related agencies and industries, has advocated the use of soil testing. Research has shown repeatedly that different stages in the adoption process are influenced by different communication sources. These sources are usually listed as mass media, friends and neighbors, agricultural agencies, and dealers and salesmen. In the trial and adoption stages agricultural agencies, including Cooperative Extension, are of secondary importance in influencing individuals to adopt an innovation. The primary influence is friends and neighbors. (Lionberger, 1960 and Copp, 1958) Further studies have also shown a relationship between rate of adoption and the information source. Unlike a late adopter, an innovator cannot rely on experience of peers; he must seek information from other sources. Therefore, mass media and Cooperative Extension are more influential with earlier adopters when it comes to influencing individuals to try or adopt an innovation. (Copp, 1958) Based upon this knowledge some writers have hypothesized that the change agents (Extension) may be more effective in reaching the later adopters through "peer intermediaries." (Schneider, 1971)

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of cases exist, and the mean of two middle numbers if the number of cases is even. (Alder, 1962)

METHODOLOGY

The universe from which the sample for the study was drawn included all commercial farmers in Pennsylvania. The sample was divided into two main sub-classes: testers or known users of soil testing, and non-testers or suspected non-users of the practice.

Testers were defined as farmers who submitted soil samples to The Pennsylvania State University testing service between January 1, 1970 and September 1, 1971. Non-testers were defined as individuals who had not tested soil during the period in question. They may have never tested, or may have tested in a year prior to 1970.

The testers' names were acquired on a random basis from The Pennsylvania State University testing service files. One-half the names were obtained from files containing duplicates of test results that were mailed to the farmers. These letters were filed by county, and every 250th name was selected. The other half of the tester sample was selected from a running list of names of farmers. This list was compiled by the testing service as these individuals' soil samples arrived for testing. This latter half of the sample was arranged only by date of processing. From this list, each 300th name was selected. The reason for this procedural change was due to the testing service changing its system of filing on May 1, 1971. If the name selected was for a non-agronomic soil test, the contiguous names were scanned, alternating

before and after each name, until an agronomic sample was found. This name was substituted for the original individual.

From these two sources 119 individual names and addresses were identified. This group of 119 individuals was then separated into 53 county groupings. At this point the appropriate Cooperative Extension Service county agents were contacted and the research project was explained to them. The county agents were asked to provide the telephone numbers of the testers and to provide another list of names of alleged nontesters.

The county agents were asked to make their selections on the following four criteria:

(1) Alleged or known nontesters (no test in 1970 or 1971)

(2) Farming enterprise that matches another one on testing list. (i.e., dairy, beef feeder)

(3) Same relative size of operation. (number cows, acres)

(4) Same geographic section of county.

Fifty-one county agents responded with a total of 154 names, addresses, and phone numbers of alleged nontesters. From this composite list -- made up of names of individuals selected at the soil testing laboratory and the names provided by the county agents -- telephone interviews were conducted.

All individuals were contacted by phone and asked the same introductory questions. (See Appendix A) The

questionnaire was so designed that a respondent could be located on one of three primary branches of an adoption tree model.

(1) Tester

(2) Nontester (tested prior to 1970)

(3) Nontester (never tested)

In addition to the information collected about soil testing practices were questions relative to farming enterprise, size of operation, family size and stage, and community involvement. The formulation of the sample list of names and the subsequent interviews and collection of data were accomplished between September 1971 and January 1972.

Upon completion of the interviews, 166 useable questionnaires resulted. They assumed the following distribution:

DISTRIBUTION OF RESPONDENTS BY CATEGORY

Sample source	Testers	Previous testers	Never tested	Total
P.S.U.	78	0	0	78
County	22	46	20	88[5]
Total	100	46	20	166

The attrition from 273 potential respondents to the 166 actual respondents can be explained as follows:

[5]Ten additional respondents exist from county sources because the interviews were completed before it was realized that the other half of the pair could not be reached.

REASONS FOR LOSSES

Source of name	Unable to interview[6]	Refused to participate	No match from Co.[7]	Extra names[8]	Total losses
P.S.U.	29	1	11	0	41
Co.Agent	21	5	0	40	66
Total	50	6	11	40	107

The final distribution of the individuals involved in the study was as follows:

TOTAL SAMPLE

Sample Source	Unuseable	Useable	Total
P.S.U.	41	78	119
Co.Agents	66	88	154
Total	107	166	273

Coding of the data for analysis consisted of checking to see that the answer to each question was correctly recorded. When the respondent was asked to give an

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[6]There were people who could not be reached for a number of reasons (i.e., deceased, no phone, no answer in four tries, incorrect name).

[7]Two counties failed to return names of potential nontesters, thus the testers' names were discarded.

[8]Several counties sent more names than were requested, however an attempt was made to contact only 119 or an equal number as testers. The extra names were used in order of appearance on the list until a match was made with each tester.

objective answer (income, actual age, number of children and so on) this answer was recorded and coded in the proper form. A listing of all responses was made for each open end question. From these discrete responses, categories of conceptually homogeneous responses were constructed. These constructed categories were coded and used for analysis.

Dependent and independent variables were selected for analysis. Factors selected as dependent variables were:

(1) Did you ever soil test?

(2) What was the last year you tested soil?

(3) If you did not soil test, did you consider soil testing either in 1970 or 1971?

The independent variables included:

(1) Age of head of household

(2) Gross farm income

(3) Education achieved by head of household

(4) Social participation of head of household

(5) Adoption tendency

(6) Ownership of crop land

The analysis consisted of utilizing a chi-square test[9] and t-test[10] for determining any statistically

[9]In the chi-square procedure the null hypothesis is based on the assumption that the two factors under consideration are independent of one another. If a statistically significant difference in value is derived, it indicates that the two factors (independent and dependent variables) are not unrelated, but in fact influence one another.

[10]In the t-test procedure the null hypothesis

significant difference obtained, based on contingency tables and a comparison of means of characteristics. (Alder, 1962)[11]

ANALYSIS

The purpose of this section is to analyze selected portions of the data collected in this study, namely the six independent variables listed earlier and the relationship that they have with the three dependent variables. The independent variables will be compared with one another as they relate to several dependent variables.

The analysis will be done on the basis of pairs of respondents. The pairs emerge from the adoption tree model (p. 5). Similar variables will be tested for relationships that may exist as a result of being on different branches of the model. Figure IV shows the placement of the respondents to the study on the adoption model.

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is based on the assumption that the two means have the identical standard deviation, thus assuming the populations they are taken from have the same standard deviations. When a statistically significant relationship exists between means it denotes that in fact the standard deviations were identical and that the difference between means is meaningful.

[11]The level of statistically significant difference that will form a basis for rejection of the null hypothesis that the two variables were not related is five percent (.05). This level of statistical significance has been chosen as it is commonly accepted by social science researchers. Such a statistical level of significance indicates that the probability is only five percent that the relationships shown in the sample are the result of sampling or measurement error or chance rather than being a true reflection of the characteristics of the sampling universe (all Commonwealth commercial farmers).

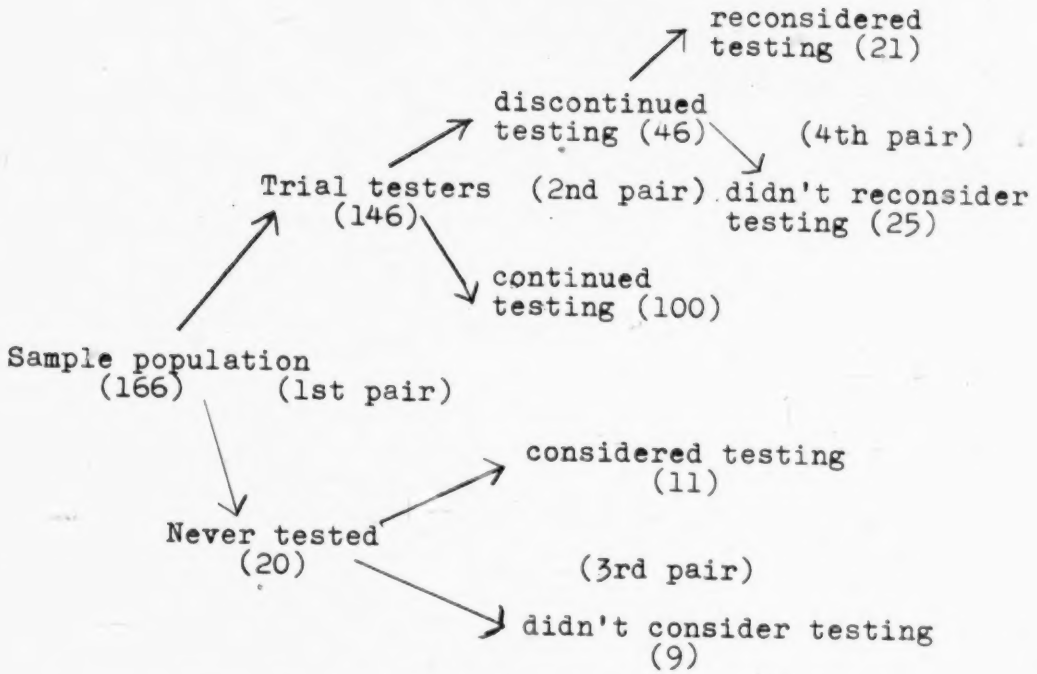

Figure IV. Respondent Distribution Adoption Tree

The numerals in the brackets show the number (N.) of individuals that fit a particular set of soil testing circumstances for placement on the schematic diagram. The pairs designated show which sub-groups of the total will be compared with one another.

The first comparisons (1st pair, Figure IV) are between the 146 trial testers and the 20 individuals who indicated that they had never tested soil. The trial testers group was defined as any individual who indicated that he has utilized the soil testing innovation on his farm one or more times, regardless of his '70-'71 crop year use. The never tested grouping was comprised of those individuals who indicated they had never tested

soil on their farm by means of a chemical analysis of a soil sample. It was assumed in the study that everyone who was interviewed was at least at the awareness stage of the five-stage model. The reason for this assumption was that everyone of the 20 who indicated they had never tested, gave no indication that they did not know what soil testing was. In fact it will be shown that 11 individuals (3rd pair, Figure IV, p. 19) had progressed to the symbolic adoption stage (Figure III).

Average of age, gross income, organizational score, and education were compared by t-test to see if statistically significant relationships existed between the means of the trial testers and never tested categories. Table I summarizes these comparisons, and it is noted that only the difference between level of formal education for the two categories appears at a statistically significant level. However, never testers tend to be slightly older, to have a smaller gross farm income, and to be less involved in organizations than their neighbor farmers who have at least tried soil testing on a trial basis. The mean never tester organizational score tends to be slightly misleading in that the modal score for the nontesters was five. Several rather active individuals in this category tended to inflate the average to nearly double that of the most frequent scores recorded by these persons.

Table I. Relationship between means of four selected socioeconomic characteristics and soil testing

Respondent Categories	Age[a] (years)	Gross farm income[b] ($1000's)	Organizational score[c]	Education[d] (years)
	- - - - - - - - - -		Means	- - - - - - - - -
Never testers	51	21	10	10
Trial testers	48	33	15	12
	$t = 1.096$ $p > .1$ $df = 164$	$t = 1.83$ $p > .1$ $df = 138$	$t = 1.926$ $p < .1 > .05$ $df = 164$	$t = 2.234$ $p < .05 > .02$ $df = 161$

[a]Age in years at last birthday.

[b]Gross farm income to nearest thousand dollars for the year 1970.

[c]Organizational score was established on a basis of response to question concerning number of organizations to which they are a member and their participation in the organization. Points were awarded as follows: 1 point for each organization of which they were a member. Attendance at organization meetings was scored for each organization to which they belong on the following basis: 4 points - usually attend, 3 points - attend quite often, 2 points - attend sometimes, 0 points - never attend. Finally 6 points were awarded for each organizational office they held. A composite score was established for each individual and means were calculated from the composite scores. All organizations were included in the score, it was not limited to agricultural related organizations.

[d]Years of formal schooling completed.

Two of the independent variables did not lend themselves to analysis by t-test because of the discrete character of the variable. These independent variables are ownership of land and adoption of other innovations.[12] The results of this analysis are shown in Tables II and III. While the relationship between soil testing and land ownership is not statistically significant, the very high proportion of those growing crops on both owned and rented land in the trial tester category may have special meaning.

Table II. Relationship between land ownership and soil testing

	Land upon which crops are grown[a]			
	Owned only N=100	Rented only N=13	Owned and Rented N=44	Total N=157
	- - - - - - - - - - percent - - - - - - - - - -			
Never testers	13	15	5	11
Trial testers	87	85	95	89

$x^2 = 2.57$ $\quad df = 2$ $\quad p = <.30>.20$

[a] N's will vary in each table as not every question was answered by each potential respondent.

[12] The statistical analysis of these two variables was by means of a contingency table and chi-square test.

Table III. Relationship between previous adoptions of dairy farming innovations and soil testing[a]

	Number of practices adopted				
	0 N=37	1 N=37	2 N=16	3 N=14	Total N=104
	- - - - - - - - percent - - - - - - - - -				
Never tested	14	3	13	0	8
Have tested	86	97	87	100	92

$$x^2 = 4.75 \quad df = 3 \quad p = (.20) > .10$$

[a]Each individual was asked if they had adopted 3 specific other innovations that related to their particular operation. Responses were recorded as "yes" or "no." Only dairy farmers were considered in this analysis, however, because of the small numbers involved with other farm enterprises.

This information coupled with the fact that trial testers average a slightly higher gross farm income than never testers suggest that trial testers may be more concerned with growth of their farming operations than never testers.

Finally, we will look at the question concerning adoption of other farming innovations. While no statistically significant relationship existed, it is important to note that none of the never testers had adopted all three of the recommended dairy practices while 15 percent of the trial testers had adopted all three innovations.

The next set of comparisons (2nd pair, Figure IV, p. 19) is between discontinuers (46) and adopters (100).

These two aggregates are a breakdown of the trial testers grouping (146) of the previous pairing. Individuals who indicated that at one time they had soil tested, but had not tested in either the 1970 or 1971 cropping year, were classified as discontinuers. Adopters were those individuals who tested soil with The Pennsylvania State University soil testing service during the calendar years of 1970 and/or 1971.

T-tests of four of the independent variables were conducted (Table IV). Statistically significant relationships were present with three of these variables.[13] Due to this significance, subsequent tests were conducted on all six of the independent variables in an attempt to more closely identify the differences.

Table IV. Relationship between four selected Socio-economic characteristic means and soil testing

	Age (years) N=146	Gross farm income ($1000's) N=127	Organizational Score N=146	Education (years) N=146
	- - - - - - - - - - Means - - - - - - - - - -			
Discontinuers	51	29	10	10
Adopters	46	34	17	12
	$p = < .02$ $t = -2.4998$ $df = 144$	$p = > .05$ $t = 0.8135$ $df = 125$	$p = < .01$ $t = 3.3244$ $df = 144$	$p = < .001$ $t = 3.7247$ $df = 144$

[13] The significant variables were age, organizational score, and educational level.

There is a trend between soil test adoption or discontinuence and age; this is shown in Table V. In fact, a linear relationship exists with this variable, that is, the younger an individual the more likely he is to be an adopter; conversely, as age increases for our sample the rate of discontinuance increases. Further, the mean age of adopters (46) in the study is less than for either discontinuers (51) or never tested individuals (51).

Table V. Relationship between age of operator and soil testing

	Age in Years				
	< 40 N=43	41-50 N=46	51-60 N=33	> 60 N=24	Total N=146
	- - - - - - - - - percent - - - - - - - - -				
Discontinuers	23	26	33	54	32
Adopters	77	74	67	46	68

$x^2 = 7.74$ $p = <.10> .05$ $df = 3$

An explanation for the fact that discontinuers account for over 50 percent of the "over 60" category may quite possibly be that discontinuers include a large segment of people who are considering retirement. Fully 28 percent of all discontinuers are over 60 years of age, while only 16 percent of the adopters reported being over 60 years of age.

The higher gross farm income of adopters was not statistically significant when compared to that of

discontinuers (Table VI). Both of these aggregates' mean gross farm income expressed in thousands of dollars were, however, higher than the never testers, the actual means were 34 for adopters, 29 for discontinuers, and 21 for never testers.

Table VI. Relationship between gross farm income and soil testing

	In thousands of dollars					
	< 10 N=29	11-20 N=27	21-35 N=35	36-50 N=19	> 50 N=17	Total N=127
	- - - - - - - - - - percent - - - - - - - - - -					
Discontinuers	31	59	17	26	24	32
Adopters	69	41	83	74	6	68

$x^2 = 13.72$ $p = <.01>.001$ $df = 4$

A serendipitious finding uncovered in the collection of data was the extent of willingness to answer this particular question. Of the never testers group, 35 percent refused to answer this question while only 12 percent of the discontinuers and adopters refused to answer. No empirical evidence can be given as to why the former group was three times more likely to refuse to answer than the latter two groups. A possible explanation is a traditional orientation of the never testers, who did not feel comfortable in divulging this information to outsiders; also it is quite conceivable that it was a result of a more intimate relationship between testers and

representatives of The Pennsylvania State University that tended to reduce the resistance of this grouping and to negate any feeling of threat implied in the income question.

The distribution of the incomes of the two groupings, adopters and discontinuers, shows a highly significant statistical relationship (Table VI), but yields no readily identifiable patterning. The relatively high proportion of adopters who had gross incomes of less than $10,000 can be explained by the fact that possibly many of them are parttime farmers. However, the evidence of this relationship was beyond the scope of the study.

The predicted relationship would have been linear between income level and stage in adoption process, that is the higher the gross farm income the higher the degree of adoption. This was not found to be the case in this study.

. Statistically significant organizational score differences were found between those individuals who had adopted and those who had discontinued testing (Table VII). The more organizational involvement of a farmer the greater the likelihood that he will also be a continuing tester. Seventy-two percent of the discontinuers had an organizational involvement score of 12 or less versus 31 percent of the testers reporting this small a score.

Table VII. Relationship between degree of organizational involvement and soil testing

	Organizational Score				
	< 6 N=44	6-12 N=30	13-20 N=32	> 20 N=40	Total N=146
	- - - - - - - - - percent - - - - - - - - -				
Discontinuers	43	47	22	15	32
Adopters	57	53	78	85	68

$$\chi^2 = 12.40 \quad p = <.01> .005 \quad df=3$$

Educational level demonstrates a consistent statistically significant relationship (Table VIII). As education increases the likelihood of having tried soil testing or of adopting the innovations also increases. In this study, seven percent of the discontinuers had more than a high school education in contrast to 31 percent of the adopters having the same level of achievement.

Table VIII. Relationship between number of years of formal education and soil testing

	Less than 8 yrs. N=36	8-12 yrs. N=74	More than 12 yrs. N=34	Total N=144
	- - - - - - - - - percent - - - - - - - - -			
Discontinuers	44	34	9	31
Adopters	56	66	91	69

$$\chi^2 = 11.20 \quad p = <.005> .001 \quad df = 2$$

A rather unexpected condition concerning land ownership was found in this study (Table IX).

Table IX. Relationship between land ownership and soil testing

	Land upon which crops are grown			
	Owned only N=87	Rented only N=11	Owned and Rented N=42	Total N=140
	- - - - - - - - - - percent - - - - - - - - - -			
Discontinuers	23	27	45	30
Adopters	77	73	55	70

$$\chi^2 = 6.72 \quad p = <.05> .01 \quad df = 2$$

In contrast to the low percentage of never testers in the "owned and rented" category (Table II), discontinuers are overrepresented in this category compared to adopters. The earlier inference about trial testers concerned with expanding the size of their farm business seems to apply equally well to both discontinuers and adopters.

A unique situation exists in the analysis of the adoption of other farm practices (Table X).

Those individual dairy farmers that discontinued soil testing were slightly less likely to have adopted dairy innovations. Also, extremely interesting was the fact that only three percent of the discontinuers were using two of the dairy innovations, while ten percent of

this cohort had actually adopted all three of the dairy innovations.

Table X. Relationship between adoption of dairy farm innovations and the adoption of soil testing

	Number of dairy practices adopted				
	0 N=32	1 N=36	2 N=14	3 N=14	Total N=96
	- - - - - - - - -		percent	- - - - - - - - -	
Discontinuers	38	39	7	21	31
Adopters	63	61	93	79	69

$$\chi^2 = 5.9 \quad p = \langle .20 \rangle .10 \quad df = 3$$

The final comparisons (Pairs 3 & 4, p. 19) on the adoption tree to be looked at are the two groupings that have either trial rejected or symbolically rejected soil testing. These farmers were asked if they had considered or reconsidered (Table XI), whichever the case may be, soil testing in the years 1970 or 1971.

Means were calculated for each of the four characteristics[14] and t-tests were used to establish the statistical significances of the relationships between means.

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[14]Statistical analysis was not made on two variables (land ownership and previous adoption rate) for this pairing because of the small N. The expected frequency for a majority of the cells would have been less than five, and thus unreliable in a chi-square test. Likewise because of the discrete nature of the variable a t-test of means would have been meaningless.

Table XI. Relationship between means of selected socio-economic characteristics and the symbolic acceptance or rejection of soil testing[a]

	Age (yrs.)	Gross farm income ($1000's)	Organizational score	Educ. (yrs.)
	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$
I Never testers N=20				
(A) considered N=11	49	27	15	11
(B) didn't consider N=9	53	13	5	9
II Discontinuers N=46				
(A) considered N=25	49	32	11	11
(B) didn't consider N=21	54	25	10	10

[a]In further analysis statistically significantly different relationships were found in but 2 of 24 cases. These cases were in the area of organizational participation in comparison of never testers / considered ././. never testers /didn't consider and never testers / didn't consider // discontinuers / considered.

The only statistically significant difference between those who considered and those who did not consider testing was for never testers. Those who considered testing (symbolic adopters) had significantly higher levels of organizational participation than those who did not consider testing (symbolic rejectors).

SUMMARY AND IMPLICATIONS

The purpose of this study was to analyze several selected socioeconomic characteristics and determine whether a relationship existed between them and the adoption or non-adoption of soil testing as a farm management tool, and further to establish whether or not a statistically significant relationship exists between adopters and imperfect (discontinuers) adopters.

The sample from whom the data were collected consisted of 166 Pennsylvania farmers. The sample was comprised of individuals whose names came from two sources: The Pennsylvania State University Testing Service, and County agents in the state.

Those names coming randomly from the testing service files were known users of the soil testing program for the years 1970 and 1971. While the names provided by the county agents were individuals who were known or suspected nontesters or discontinuers (tested previous to 1970-71), an attempt was made to pair the representatives of the second group with the individuals who made up the

first grouping. The procedure for this pairing was done by providing the county agents with the names of the known testers from their county and to ask them to match as nearly as possible by size and type of farm operation and, if possible, by neighborhood with those individuals who were known or suspected nontesters.

Upon compiling the list of potential respondents, a telephone interview was conducted with each individual (See Appendix B). Then all responses were coded and transferred to IBM cards; analysis summarization was done by computer.

The relationship of the characteristics selected showed that differences did exist between those individuals who had continued soil testing and those that never soil tested, and/or had discontinued the practice.

Never testers had a lower level of formal education than those who had previously used soil testing in their farm business. Although not statistically significant for the limited number of farmers in this study, small differences were present with (1) never testers being older than testers, (2) testers having higher gross farm income than never testers, and (3) testers having a higher organizational participation score than never testers. Land ownership and level of other farm practice adoption were not related to adoption of soil testing.

In the comparison of adopters and discontinuers the same characteristics were considered for relationships

and the following was found.

Adopters were younger, (in fact, the youngest in the study) had higher organizational participation, had nearly two additional years of formal schooling, were more likely to own their crop land, and were slightly more prone to adopt other farming innovations than were the farmers who had discontinued soil testing. No relationship was found between the gross farm income of adopters and those individuals who had discontinued the use of soil testing.

Further, it was found that among those individuals who had never tested but had considered testing (symbolic adopters), their level of organizational participation was higher than those farmers who had neither tested nor considered testing. No reliable differences in age, gross farm income and formal education were present between these two categories.

The same kind of analysis was done for former soil testers. Those who had discontinued but considered testing again were no different in age, education, income, and organizational participation than those who had discontinued and rejected the idea of further testing.

IMPLICATIONS FOR EDUCATIONAL PROGRAMING

If the advocates of soil testing as a farm management tool are to effectively encourage the wider adoption of the practice they must understand the heterogeneities

of their potential audience. They should have available the information that shows them the differences between selected characteristics of adopters and those currently not testing.

One may assume that the adoption of the practice of soil testing by all farmers in Pennsylvania is a highly desirable state. However, whether this is or ever can be achieved is highly questionable. Furthermore, in terms of organizational efficiency, one may question even if the attempt to attain this state is worthwhile.

A reasonable goal needs to be established. Perhaps 85 percent of the farmers need to be ultimately encouraged to adopt soil testing. There are farmers who cannot be convinced to adopt this practice without an unreasonable expenditure of time and money by either The Cooperative Extension Service or industrial personnel.

However, many individuals gave indication that they would soil test if the correct approach is made to them. It is the job of the advocates, Cooperative Extension, fertilizer and lime companies, and other interested groups, to identify the methods and launch the efforts that will convince these individuals to adopt.

Six characteristics have been analyzed in this study. These give some clues as to how people may be reached, because we know that differences between the groupings do exist.

The most feasible groupings for the advocates to spend a major portion of their time with is the symbolic adopter, the individual who has made the mental decision that soil testing is a desirable program but hasn't as yet made an actual test. This person is closer to adoption than the farmer who has yet to make the symbolic decision to test his soil. Therefore, a major emphasis to enroll these persons as actual adopters would be the most productive given limited resources. This is not to say that the farmer at the pre-evaluation stage (Figure II, p. 6) should be forgotten, but he should not receive primary emphasis.

The emphasis that may cause symbolic adopters to become adopters may not be that aimed at improving his knowledge of the procedure. Rather, emphasis should be given to action that facilitates getting the actual sample collected for testing. This approach can be achieved through incentives such as a source of free or reduced cost testing kits (e.g., subsidized by commercial firms). Someone other than the farmer could collect the sample. This "collector" could be a representative of a firm that supplies farm materials or possibly an employee (para-professional) of an organization such as Cooperative Extension that could take samples and interpret results. The cost of this alternative method could be included in the cost of the test.

The grouping of individuals most difficult to reach or that has the most resistance to soil testing is that composed of persons that have not considered testing. These individuals tend to be older, less educated, and participate less in organizations than adopters. The never testers have not been reached by traditional methods. These persons do not attend meetings and probably do not include circular letters or magazines in their usual reading habits. Therefore, the most apparent way to reach such persons is involving neighbors who are currently adopters as change agents. This approach could be more productive than using professionals or paraprofessionals because of the skepticism with which people like never testers have of "outsiders." The role to be fulfilled in this situation is not one of facilitating only, but also of educating. The individual who has not made symbolic adoption needs further information upon which to base a decision.

LIMITATIONS TO THE STUDY

One part of the study that needs to be expanded is nontesters. There needs to be more never tested persons surveyed to establish if the findings of this study accurately depict this grouping.

A follow-up study needs to be launched with those individuals labeled adopters to find how many and for what reasons they may become or have become discontinuers.

The assumption that all of them will continue to test soil, because they tested in 1970 or 1971 is false. The characteristics of an adopter are not yet final, as some of the individuals contained within this classification are actually going to be discontinuers.

Also, there are some limitations to the study based on study bias. This is particularly a result of the method of getting a portion of the sample. Those individuals whose names were provided by the county agents tend to contaminate the results, because they are all people with whom the county agent has had contact. Quite possibly there exists in each county others whom the agent does not know that are more representative of the nontesting clientele. Further, the method of sampling permits little consideration of people who employ other testing methods or services. Additionally there is no assurance that the Extension agents followed the directions as to who should be selected, and possibly there is no homogeneity between adopters and nonadopters. Finally, no analysis of parttime operators has been made in this study.

Improvements could be made in the sampling procedure. For example, area sampling may have given more reliable data of adopters vs. nonadopters.

Finally, a follow-up study needs to be made of the essential characteristics of adopters in order to examine the relationship between testing and the follow-up of the

recommendations of the test. It seems quite plausible that not all individuals who test follow the recommendations of the soil test.

So it seems to this author that the answers most needed are to these questions:

(1) Are you still testing? (This needs to be asked of those individuals who tested during 1970 and 1971.)

(2) Did you follow the recommendations of the soil test?

(3) Would you soil test if someone would provide the service of taking the soil sample? At a cost to the individual? (This would be asked of those who are not currently testing.)

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APPENDIX A

The Pennsylvania State University
Department of Agricultural Economics and Rural Sociology
Soil Testing Survey
Phase I: User Versus Non-User
Leadley, Ott, Baker and Bair

Interviewer: 1 2 3 4 5 6 7 8 9 _____ (code)

Sample Source: PSU Soil Lab=1 Co. Agent=2 _____ (code)

Respondent's Name: _____

Respondent's Mailing Address: _____

_____

Respondent's Telephone Number: _____
(Area Code) (Local Exchange)

Calling Hour: _____AM/PM _____Am/PM _____AM/PM
(first) (second) (third)

I am calling for the Pennsylvania State University. We are making a study to find out how farmers feel about soil testing. You were selected as part of our sample and we would like to ask your help in our study. First, I'd like to ask you some questions about your recent experience with soil testing...

1.1 What was the most recent year you can recall one or more soil samples being sent from your farm for testing? We are referring here to tests for nitrogen, phosphorus and potassium, not solely for lime level. _____ (year)

IF TESTER IN 1970 OR 1971, GO TO QUESTION 1.2

IF NON-TESTER IN 1970 OR 1971, GO TO QUESTION 3.3

1.2 Who recommended or suggested you obtain a soil test?

1=County agent
2=Fertilizer sales agent
3=Soil conservation staff
Other: _____ _____ (code)

1.3 How many different fields were sampled in 197__?

_____ (number)

1.4 Who took the soil samples?

1=Operator
2=Operator's Employee
3=Fertilizer Sales Agent
4=Lime Sales Agent
Other: _____

_____ (code)

2.1 From what source did you obtain the name of the soil type used on your soil test application?

1=Soil Maps
2=Soil Conservation Service Office
Other: _____

_____ (code)

2.2 To whom were the samples sent?

1=Penn State
Other: _____

_____ (code)

2.3 Who paid for the soil testing ($2.00/ sample at PSU)?

1=Operator
2=Fertilizer Co.
3=Lime Co.
4=Landlord
Other: _____

_____ (code)

2.4 Did you receive the results of these tests?

1=No
2=Yes
3=Don't Know

_____ (code)

2.5 Did anyone advise you concerning the use of the fertilizer recommendations?

1=No GO TO QUESTION 2.6
2=Yes ASK WHO
3=Don't Know GO TO QUESTION 2.6
4=County Agent
5=Fertilizer Co. Agent
6=Lime Co. Agent
7=Another Farmer

8=SCS
Other: _____ (code)

2.6 What was your main reason for having these tests made on your soil?

1=Qualify for Federal subsidy payments
2=To get greater crop yields
3=To get higher quality yields
4=More efficient crop production
5=To select appropriate analysis and/or quantity of fertilizer
6=For the crop
7=To get rid of the salesman
8=To solve a cropping problem
Other: _____ (code)

3.1 Did you have any other reasons for soil testing?

1=Qualify for Federal subsidy payments
2=To get greater crop yields
3=To get higher quality crop yields
4=More efficient crop production
5=To select appropriate analysis and/or quantity of fertilizer for the crop
6=To get rid of the salesman
7=To solve a cropping problem
Other: _____
GO TO QUESTION 5.4 (code)

3.2 Do you own or rent the land from which these soil tests were taken?

1=Own
2=Rent
3=Share Crops
Other: _____ (code)

QUESTIONS 3.3-5.3 FOR NON-TESTERS ONLY

3.3 Did you consider taking soil samples for testing in either 1970 or 1971?

1=Yes GO TO QUESTION 3.4
2=No GO TO QUESTION 4.3

(Code)

3.4 What was the most significant reason you were not able to take the soil samples that you originally planned on having tested?

1=Not convenient
2=Could not afford to pay
3=Too many forms and papers to fill out
4=Didn't know who to get supplies from
5=Decided I could get along without a test
6=By the time I got around to take samples, it was too late for the crop

(code)

3.5 Did you have any other reasons why you were unable to take the soil samples?

1=Not convenient
2=Could not afford to pay
3=Too many forms and papers to fill out
4=Didn't know who to get supplies from
5=Decided I could get along without a test
6=By the time I got around to take samples, it was too late for the crop

(code)

3.6 How do you arrive at how much and what analysis fertilizer to apply to your major crop? (Major=largest acreage)

_____

(crop)

4.1 Last year what crop was this?

1=Alfalfa
2=Alfalfa-Grass (less than 50% Grass)
3=Alfalfa-Grass (More than 50% Grass)
4=Alfalfa, Clover, Grass mixture
5=Alfalfa-Birdsfoot Trefoil mixture
6=Birdsfoot Trefoil or Clover
7=Birdsfoot Trefoil or Clover-Grass (Less than 50% Grass)
8=Birdsfoot Trefoil or Clover-Grass (More than 50% Grass)
9=Grass Hay, Grass Silage or Tall Grass Pasture

10=Bluegrass - Permanent Pasture
11=Crown Vetch
12=Hay or Pasture Seeded without Small Grain
13=Wheat without Forage Seeding
14=Wheat with Forage Seeding
15=Oats without Forage Seeding
16=Oats with Forage Seeding
17=Barley without Forage Seeding
18=Barley with Forage Seeding
19=Rye without Forage Seeding
20=Rye with Forage Seeding
21=Corn or Sorghum
22=Soybeans
23=Tobacco
24=Sudangrass
25=Sorghum-Sudan Hybrid
26=Potatoes
27=Buckwheat

(code)

4.2 How much fertilizer did you put on this crop last year?

_____ / _____ / _____
(analysis) (pounds/acre)

SKIP TO QUESTION 5.4

4.3 How do you arrive at how much and what analysis fertilizer to apply to your largest acreage crop?

(code)

5.1 Last year what crop was this?

1=Alfalfa
2=Alfalfa-Grass (Less than 50% Grass)
3=Alfalfa-Grass (More than 50% Grass)
4=Alfalfa, Clover, Grass mixture
5=Alfalfa-Birdsfoot Trefoil mixture
6=Birdsfoot Trefoil or Clover
7=Birdsfoot Trefoil or Clover-Grass (Less than 50% Grass)
8=Birdsfoot Trefoil or Clover-Grass (More than 50% Grass)
9=Grass Hay, Grass Silage or Tall Grass Pasture
10=Bluegrass - Permanent Pasture
11=Crown Vetch
12=Hay or Pasture Seeded without Small Grain
13=Wheat without Forage Seeding
14=Wheat with Forage Seeding

15=Oats without Forage Seeding
16=Oats with Forage Seeding
17=Barley without Forage Seeding
18=Barley with Forage Seeding
19=Rye without Forage Seeding
20=Rye with Forage Seeding
21=Corn or Sorghum
22=Soybeans
23=Tobacco
24=Sudangrass
25=Sorghum-Sudan Hybrid
26=Potatoes
27=Buckwheat

(code)

5.2 How much fertilizer did you put on this crop last year?

_____ / _____ / _____ (analysis) _____ (pounds/acre)

5.3 What do you feel was the most important reason why you did not have soil tested last year?

1=Not convenient
2=Could not afford to pay
3=Too many forms and papers to fill out
4=Didn't know who to get supplies from
5=Decided I could get along without a test
6=By the time I get around to take samples, it was too late for the crop

(code)

Now I'd like to ask some questions about your farm operations.

5.4 Do you own or rent the land on which you grow crops?

1=Own
2=Rent
3=Share Crop
Other: _____

(code)

6.1 In terms of total sales, what is the largest enterprise in your business?

1=Dairy
2=Eggs
3=Broilers

4=Field Crops
5=Beef Feeder
6=Beef Cow/Calf
7=Sheep Feeder
8=Sheep Breeder
9=Swine Feeder
10=Swine Breeder
11=Vegetables GO TO QUESTION 9.1
12=Fruit GO TO QUESTION 9.1

(code)

6.2 Major farm enterprise: output measure

DAIRY	How many pounds of milk per cow did you sell last year?	(cwt.)
POULTRY-EGGS	How many eggs per hen did you sell last year?	(number)
POULTRY-BROILERS	How many broilers per man did you sell last year?	(number)
FIELD CROPS	What was your biggest acreage crop? _____	(code)
	What yield/acre have you had for this crop over the past two years? Units=_____ (tons, bushels)	(number)
LIVESTOCK	BEEF - Feeder - Number of fed cattle sold per man	(number)
	- Breeder - Number of cows per man	(number)
	SHEEP - Feeder - Number of fed lambs sold per man	(number)
	- Breeder - Number of ewes per man	(number)

SWINE - Feeder - Number of fed hogs per man

(number)

- Breeder - Number of sows per man

(number)

VEGETABLE AND FRUIT - DON'T ASK THIS QUESTION
GO TO 9.1

7.1 Which of the following practices are you presently using on your farm? (CODE: 1=NO, 2=YES, 3=DON'T KNOW, 4=DOESN'T APPLY)

DAIRY

1. production testing such as DHIA, Owner-sampling?

(code)

2. mastitis control program such as test dipping, testing for mastitis infection?

(code)

3. forage analysis and feed programming?

(code)

EGGS

1. cages or wire floor?

(code)

2. egg gathering directly on filler flats on pallets for shipment?

(code)

3. insulated house with mechanical ventilation?

(code)

BROILERS

1. mechanical handling of feed?

(code)

2. vaccination against communicable diseases

(code)

3. feed conversion records?

(code)

FIELD CROPS

1. application of fertilizer in the fall?

(code)

2. sod-seeding of crops, e.g., no-till corn or legumes?

(code)

3. use blight-resistant corn last year (use N-cytoplasm seed)?

(code)

BEEF FEEDER 1. feeding corn silage?

(code)

2. use of growth stimulants?

(code)

3. forage testing and feed programming?

(code)

BEEF BREEDER 1. magnesium supplement while on pasture?

(code)

2. systematic cross breeding (e.g., three breed rotational cross)?

(code)

3. performance testing?

(code)

SHEEP FEEDER DON'T ASK THIS QUESTION - GO TO QUESTION 9.1

SHEEP BREEDER 1. flush ewes before breeding?

(code)

2. creep feed lambs?

(code)

3. performance testing?

(code)

SWINE FEEDER 1. mechanical manure handling with slatted floor?

(code)

2. mechanical handling of feed? (e.g., auger feeder?)

(code)

3. feed conversion records?

(code)

SWINE BREEDER 1. insulated farrowing quarters?

(code)

2. mechanical manure handling with slatted floor?

(code)

3. select boars on basis of performance testing?

(code)

VEGETABLE AND FRUIT - DON'T ASK THIS QUESTION - GO TO QUESTION 9.1

9.1 What was the gross income of your farm business for 1970? (an estimate within a $1,000 would be accurate enough for our survey)

(dollars) in 000's

IF RESPONDENT HESITATES, REASSURE HIM THAT WE WANT ONLY AN ESTIMATE AND THAT ALL INFORMATION IS STRICTLY CONFIDENTIAL

Now, I'd like to finish our conversation with a few questions about yourself and your family ...

9.2 What is your present age?

(years)

9.3 Are you married? 1=No 2=Yes

(Code)

9.4 Do you have children at home? IF "YES" ASK FOR AGES

(age) (age) (age) (age) (age) (age) (age)

9.5 What is the highest grade of school you have attended?

(comments) (years)

9.6 Participation in community organizations

Name of Organization of which a member	Attendance 1=usually 2=quite often 3=sometimes 4=not at all	Offices (Name of office)
_____	1 2 3 4	_____
_____	1 2 3 4	_____
_____	1 2 3 4	_____
_____	1 2 3 4	_____
_____	1 2 3 4	_____
_____	1 2 3 4	_____
_____	1 2 3 4	_____
_____	1 2 3 4	_____

APPENDIX B

Table B-1. Agency or individual recommending soil testing. Pennsylvania farmers soil testing in 1970-71

	Farmers (N=99) Percentage
County Agent	25
Fertilizer Sales Agent	14
Soil Conservation Staff	13
Other Farmer	2
Penn State	2
Tested on own initiative	44
	100

Table B-2. Number of fields tested, Pennsylvania farmers soil testing in 1970-71

Numbers of Fields Tested	Farmers (N=99) Percentages
1	10
2-5	49
6-10	22
11-15	10
More than 15	9
	100

Table B-3. Individual collecting the soil sample, Pennsylvania farmers soil testing in 1970-71

Who Took Sample	Farmers (N=100) Percentage
Farm Operator	65
Farm Employee	7
Fertilizer Salesman	24
Lime Salesman	2
County Agent	2
	100

Table B-4. Source of the name of the soil type used on the sample questionnaire, Pennsylvania farmers soil testing in 1970-71

	Farmers (N=99) Percentage
Soil Map	33
Soil Conservation Service	28
Traditional Knowledge	8
Guessed at Soil Type	2
3rd Party	9
Left Blank	20
	100

Table B-5. Laboratory to which soil samples were sent, Pennsylvania farmers soil testing in 1970-71

Laboratory	Farmers (N=99) Percentage
P.S.U.	96
Other Lab.	3
Didn't know	1
	100

Table B-6. Payment for soil test made by various sources, Pennsylvania farmers soil testing in 1970-71

Source of Payment for testing	Farmers (N=99) Percentage
Farmer	44
Fertilizer Company	49
Lime Company	3
Farmer/Industry Shared	4
	100

Table B-7. The results of the test were received from the laboratory, Pennsylvania farmers soil testing in 1970-71

Results Received	Farmers (N=99) Percentage
Yes	97
No	3
	100

Table B-8. Source of advice on use of soil test results, Pennsylvania farmers soil testing in 1970-71

Source of Advice	Farmers (N=99) Percentage
County Agent	9
P.S.U. Extension Specialist	2
Fertilizer Salesman	33
Lime Salesman	1
Soil Conservation Service Representative	6
No Outside Advice	49
	100

Table B-9. Ownership status of fields tested, Pennsylvania farmers soil testing in 1970-71

Land Ownership Status	Farmers (N=98) Percentage
Own	74
Rent	8
Own and Rent	13
Share Crop	1
Didn't Know	4
	100

Table B-10. Principle reason for soil testing, Pennsylvania farmers soil testing in 1970-71

Reasons for Testing	Farmers (N=99) Percentage
Qualify for Federal subsidy payments	9
Increase Yields	18
Increase Crop Quality	5
Increase Production Efficiency	14
Select Appropriate Fertilizer Application	43
Solve Cropping Problem	8
Soil Improvement	3
	100

Table B-11. Reasons given for not following through on plans to soil test, Pennsylvania farmers not soil testing in 1970-71

Reasons for not Testing	Farmers (N=34) Percentage
Not Convenient	65
Didn't Need it	11
Put off Taking Sample Until Too Late for Crop	15
Couldn't Afford Test	3
Others	6
	100

Table B-12. Criteria for choosing rate of fertilization, Pennsylvania farmers considering but not soil testing in 1970-71

Select Fertilizer Application by:	Farmers (N=34) Percentage
Previous Experience/Previous Practice	44
Guess	32
Used Fixed Amount	10
Prior Test Information	2
Advice of Other Party	2
What I Can Afford	5
No Answer	5
	100

Table B-13. Criteria for choosing rate of fertilization, Pennsylvania farmers not considering/not soil testing in 1970-71

Select Fertilizer Application By:	Farmers (N=32) Percentage
Previous Experience/Previous Practice	44
Guess	23
No Fertilizer Needed	6
Prior Test Information	12
Used Fixed Amount	9
Other	6
	100

Table B-14. Reasons for not testing soil in 1970-71, Pennsylvania farmers not soil testing in 1970-71

Reasons for not testing 1970-71	Farmers (N=29) Percentage
Not Convenient	42
Couldn't Afford Test	7
Didn't Need it	41
Test Not Adequate	7
Not Interested	3
	100

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